

ABSTRACT OF THE DISCLOSURE

A method of depositing a film of a metal chalcogenide. The first of
5 these methods includes the steps of: contacting at least one metal
chalcogenide, a hydrazine compound and optionally, an elemental
chalcogen, to produce a solution of a hydrazinium-based precursor of the
metal chalcogenide; applying the solution of the hydrazinium-based
precursor of the metal chalcogenide onto a substrate to produce a film of
10 the precursor; and thereafter annealing the film of the precursor to remove
excess hydrazine and hydrazinium chalcogenide salts to produce a metal
chalcogenide film on the substrate. The second of these methods
includes the steps of: contacting: at least one metal chalcogenide and a
salt of an amine compound to produce an ammonium-based precursor of
15 the metal chalcogenide; contacting the ammonium-based precursor of the
metal chalcogenide and a hydrazine compound, and optionally, an
elemental chalcogen, to produce a solution of a hydrazinium-based
precursor of the metal chalcogenide in the hydrazine compound; applying
the solution of the hydrazinium-based precursor onto a substrate to
20 produce a film; and thereafter, annealing to produce a metal chalcogenide
film. Also provided is a thin-film field-effect transistor device using the
metal chalcogenides as the channel layer.